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METHOD AND APPARATUS FOR RELOCATING A PART OF A SERVICE LOGIC PROGRAM AND FOR COMMUNICATION BETWEEN THE RELOCATED PART AND THE PART OF THIS SERVICE LOGIC PROGRAM REMAINING AT THE SERVICE PROVIDER IN AN

5 INTELLIGENT NETWORK

BACKGROUND OF THE INVENTION

A farther and farther-reaching use of the technology of intelligent networks IN is being made in the field of telecommunications. What is thereby involved is an architectural concept that, among other things, allows network operators to define and offer telecommunication services for their customers in a simple way. The architecture

10 can be applied to many telecommunication networks such as, for example, PSTN or N-ISDN.

There are three critical function units in an intelligent network:

• call handling functions (for example, call handling, the basic functions of telecommunication networks)

15 • service execution functions (for example, switching, resource control)

• service management functions SMF (including development, offering, administering IN services).

One result of the SMF is the service logic program that can be loaded onto a service control point SCP and be implemented in the SCP. It is also possible to

20 distribute this service logic onto a plurality of SCPs, wherein a complete copy of the service logic program is employed. The service logic program is implemented when a service call from a service user arrives at a switching center (service switching point SSP).

An important point in producing services in an intelligent network is

25 charging for these services. Hence, the service logic generates a charge information (charging ticket), such as in the form

TC_CONTINUE(FurnishChargingInformation, SendChargingInformation, Connect) (see Q.1218 with respect thereto, for example). These information are delivered to a central location (billing center) and processed there. The data contained therein are employed

for charging the account of the customer or (for instance in the case of "free phone") ,for instance,

the account of the service subscriber or both accounts.

A special characteristic of this procedure is the possibility of also modifying the current

charge rate during an existing connection, for instance Such as upon entry into a new rate time,

discount given long calls or the like.

With the intensified introduction of computer telephony integration (CTI)

and the continued development of distributed applications like Java, the services

offered in the IN will also change in future. For this purpose, it will become necessary

to install "more intelligent" devices at, for example, the ultimate consumer. In order to

also completely exploit the additional possibilities of these devices, it will be necessary

to expand the concept of the intelligent networks.

Summary of The Invention

An object of the invention is to offer service providers and service users in

a communications network a more flexible possibility of having the service logic

needed for an offered service run.

and other objects are by

This object is achieved in that a method is defined with which various parts

of a service logic can be distributed onto various entities of a system and can

at the various entities

collaborate and communicate with one another thereat. An apparatus is specified with

which a customer of an intelligent network can use a service at a provider, the service

logic thereof running partly centrally at the service provider and partly relocated, for

example, in the terminal equipment of the customer.

The definition and offering of new services becomes possible due to the

division of the service logic into a centralized part and a decentralized part. For

example, additional information about connections can be made available to the

customer, these being capable of being further-processed or interpreted in some other

way. Momentarily existing media failures can be avoided. For instance, the customer

searches a telephone number via his PC and immediately dials the desired number by

pressing a button at the PC. Further usage possibilities of the connections for which a

"more intelligent" terminal device is required can be opened up.

Advantageous developments and improvements are provided in the

subclaims.

The division of the service logic thereby derives from the type of logic and the service realized ~~therewith.~~ according to the present invention In most instances, it will be ~~meaningful~~ significant to place the relocated part of the service logic on the terminal equipment of the customer. It is also ~~meaningful~~ significant to use the connections (~~for example~~ e.g., ISDN) that already exist between the ~~central entity and the relocated part, i.e., for instance, the terminal equipment. That~~ part of the service logic that is responsible for generating the charge information must be given special consideration.

~~The invention is explained below on the basis of exemplary embodiments. The Figure thereby shows a possible structure with a part of an intelligent network.~~

The Figure shows a schematic arrangement of the distribution of a service logic in an intelligent network IN and the communication between the parts of the service logic required therefor.

~~The~~ A central part of the service logic DL is ~~thereby~~ located in ~~the~~ a service control point SCP. The relocated part of the corresponding service logic DL' is located on the telecommunication terminal equipment TE of the service user in this example. The two parts of the service logic are connected to one another by a local exchange OV. The terminal equipment is thereby connected to the local exchange OV with an ISDN line. For example, the control signals are communicated on this connection with facility information elements FIE via the D-channel of the ISDN line. The local exchange OV is in turn connected to the service control point SCP on which the central part of the service logic runs. This connection occurs with the expanded INAP (intelligent network application protocol). At the other side, the service user is also connected via the local exchange to a switching node (service switching point SSP) of the intelligent network.

In this case, ~~[...]~~ for the communication of the relocated part of the service logic DL' with the central part of the service logic DL can be implemented on the SCP with communication mechanisms that are already known and that must be somewhat expanded for this purpose.

The data communication connection between the relocated parts and the central part of the service logic must meet the following demands:

On page 3:

line 2, replace "therewith" with --according to the present invention--; and replace "meaningful" with --significant--;

line 4, replace "meaningful" with --significant--; and replace "for example" with --e.g.--;

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replace line 5 with the following: --central entity and the relocated part (i.e., the terminal equipment). The--;

delete lines 8 and 9 and insert the following:

--Additional advantages and novel features of the invention will be set forth, in part, in the description that follows and, in part, will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

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BRIEF DESCRIPTION OF THE DRAWINGS

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Reference is made to the attached Figure. This Figure shows a structure with a part of an intelligent network according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

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line 13, replace "The" (first occurrence) with --A--; delete "thereby"; and replace "the" (third occurrence) with --a--; and

line 25, delete "[...] for the".

On page 4:

replace lines 1-13 with the following paragraph:

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--the connection is automatically operational when the device that contains the relocated part is connected or turned on; high outage

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INS A5

has

- the connection is automatically operational when the device that contains the relocated part is connected or turned on;

- high outage dependability and recovery capability after a connection outage,

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- employment of the existing physical connections of the external device to the IN,

- parallel payload channels dare not be influenced.

The service logic must thereby satisfy the following conditions:

- no manual interventions needed at the device for administration and

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operation;

- security assured, for instance by unambiguously assigned identities,

- whereby the existing numberings should be employable for the addressing;

- suitable for a multitude of device types and interfaces:

What are referred to as facility information elements FIE can be employed

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in this case for the first part of the link that, for example, leads via an existing ISDN

connection from the service user to the local exchange. The D-channel provided for

signalling in ISDN can be employed as a connecting path. These FIE elements are

already known from the ETS 300 196-1. The FIE elements assigned the job of

functioning as containers for IN services. The content of these FIEs, normally referred

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to as "component", is "pre-"used in order to control what are referred to as

supplementary services. The exact structure of the components is subject to the rules

of BER and ASN.1. No expansion in the definitions of the FIE in the Standard is

necessary.

User to service information (USI) signalling has already been designed for

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"call unrelated services" such as, for example, the short message service. This is

thereby composed of two parts: the service-to-user information (STUI) part and, in the

opposite direction, the user-to-service information (UTSI) part.

Up to now, this signalling was not yet employed for the service control. As a result of

an expansion of the USI method standardized in the INAP, the control of the service

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logic can be implemented here via the CCS7 network that already exists.

The following operations must be transferred from the norm Q.1218 (in a more recent generation, Q.1228, Capability Set CS-2 for intelligent networks) and must be adapted or, ~~respectively,~~ recreated:

ReportUTSI	(OV→SCF)	Reports UTSI information elements (like SSF-SCF interface)
RequestReportUTSI	(SCF→OV)	Requests the monitoring of UTSI elements (like SSF-SCF interface)
SendSTUI	(SCF→OV)	Requests an STUI information element at the SSF (like ITU-T Q.1228 SSF-SCF).

In this solution, one is dependent on the existence of an ISDN connection to the terminal equipment. In order to assure a greater variety of terminal equipment and interfaces, a further possible realization composed of Java technology is available. A programming interface ~~is already prepared for this~~, what is referred to as the Java telephony application programming interface ~~JTAPI~~ (JTAPI) is already prepared for this. A description of ~~this~~ JTAPI is found, for example, at http://java.sun.com/products/jtapi.

Applications in the telecommunications area can be realized in a simple way with the object-oriented development environment in the modular system. The JTAPI call model is composed of six different Java objects that respectively represent a conceptual or physical entity in the telecommunication. Various hardware platforms and software interfaces are covered; and a security mechanism is likewise already provided. (Java is a trademark of Sun Microsystems.)

The charge information is again considerably separately below. It can be significant ~~meaningful~~ that a charge information ticket is not generated from the central entity but from the part of the service logic that is located in the relocated part of the service logic.

The transmission of the charge ticket ~~ensues~~ is performed according to the same strategy that was already described in detail above. ~~What is thereby involved is~~ Transmission of the change ticket includes the charging function in conformity with the contract between network operator, subscriber and customer.

It must be assured, however, that no fraudulent tickets proceed to the billing center, which then processes the tickets.

Falsifications can be prevented by traditional methods like the insertion of a signature. Another possibility of preventing fraudulent tickets is performed by checking all charge

5   tickets with the central part of the service logic. Thus, the charge tickets of the relocated part of the service logic are viewed as "proposals" or "drafts" that can be accepted, modified or rejected by the central part of the service logic before they are forwarded for final processing to the billing center (the central entity that monitors and logs the charging of the service offering).

10   When the central part of the service logic receives such a charge ticket, it should review the plausibility of the requested charge. Insofar as this is assured, the ticket can be forwarded to the billing center with or without changes.

When the charge tickets received from the relocated entity are not correct or fail to arrive, the central part of the service logic must trigger a reaction. This can occur due

15   to transmission errors or as a result of an explicit manipulation. Possible reactions are, for example, the immediate release of the connection, generating a "fraud ticket" or at least overwriting the incorrect ticket.

List of References

ETS 300 196-1 (August 1993)

Integrated Services Digital Network (ISDN);

Generic functional protocol for the support of supplementary services; Digital

5   Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol Specification

ITU-T Recommendation Q.1218 (10/95)

Intelligent Network,

Interface Recommendation for Intelligent Network CORRESPONDS-1

List of Abbreviations

10   ASN.1   Abstract Syntax Notation 1

BER   Basic Encoding Rules

CCS7   Common Channel Signalling No. 7

CTI   Computer Telephony Integration

FIE   Facility Information Element

15   INAP   Intelligent Network Application Protocol

ISDN   Integrated Services Digital Network

ISUP   Integrated Services User Part

JTAPI   Java Telephony Application Programming Interface

PSTN   Public Switched Telephone Network

20   USI   User-to-Service Information

UTSI   User-to-Service Information

SCCP   Signalling Connection Control Part

SCF   Service Control Function

SCP   Service Control Part

25   SMF   Service Management Function

SSP   Service Switching Point

STUI   Service to User Information

TCAP   Transaction Control Application Part